

# ACT Intermediate Algebra Problem Set

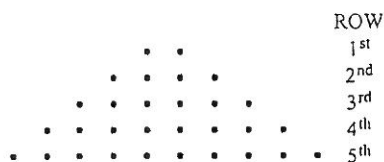
1. What is the  $x$ -coordinate of the point in the standard  $(x, y)$  coordinate plane at which the two lines  $y = -2x + 7$  and  $y = 3x - 3$  intersect?

A. 10  
B. 5  
C. 3  
D. 2  
E. 1

2. Using the complex number  $i$ , where  $i^2 = -1$ ,  
 $\frac{2}{(1-i)} \times \frac{(1+i)}{(1+i)} = ?$

F.  $1+i$   
G.  $i-1$   
H.  $1-i$   
J.  $2(1+i)$   
K.  $2(1-i)$

3. Which of the following describes the total number of dots in the first  $n$  rows of the triangular arrangement below?



A. 30  
B.  $2n$   
C.  $n^2$   
D.  $n(n+1)$   
E.  $2n + 2(n-1)$

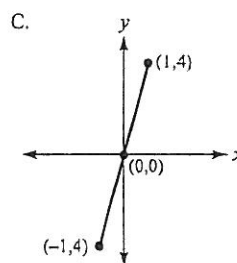
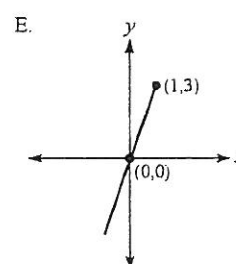
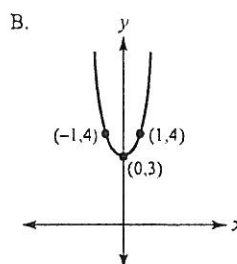
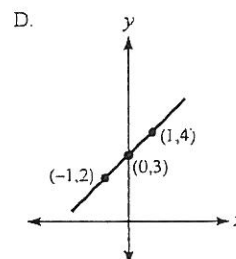
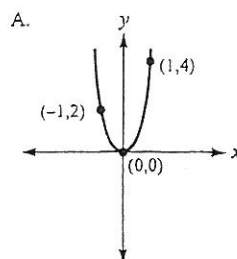
4. If  $f(x) = 2x^2 + 3$ , then  $f(x+h) = ?$

F.  $2x^2 + h^2$   
G.  $2x^2 + h + 3$   
H.  $2x^2 + 2h^2 + 3$   
J.  $x^2 + 2xh + h^2 + 3$   
K.  $2x^2 + 4xh + 2h^2 + 3$

5. If  $x = 3r - 4$  and  $y = 3r + 2$ , which of the following expresses  $y$  in terms of  $x$ ?

A.  $y = x + 2$   
B.  $y = x + 6$   
C.  $y = 9r + 14$   
D.  $y = 6r - 2$   
E.  $y = 3x + 14$

6. Which of the following is the graph, in the standard  $(x, y)$  coordinate plane, of  $y = \frac{x^2 + 3x}{x}$ ?



7. What is the slope of any line parallel to the line  $2x - 3y = 7$ ?

F. -3

G.  $-\frac{2}{3}$

H.  $\frac{2}{3}$

J. 2

K. 3

8. For a certain quadratic equation,  $ax^2 + bx + c = 0$ , the 2 solutions are  $x = \frac{3}{4}$  and  $x = -\frac{2}{5}$ . Which of the following could be factors of  $ax^2 + bx + c$ ?

F.  $(4x - 3)$  AND  $(5x + 2)$

G.  $(4x - 2)$  AND  $(5x + 3)$

H.  $(4x + 2)$  AND  $(5x - 3)$

J.  $(4x + 3)$  AND  $(5x - 2)$

K.  $(4x + 3)$  AND  $(5x + 2)$

9. A rectangular parking lot that is 3 feet longer than it is wide has an area of 550 square feet. How many feet long is the parking lot?

F. 19  
G. 20  
H. 22  
J. 25  
K. 28

10. Which of the following is the solution set of  $x + 2 > -4$ ?

F.  $\{x: x < -6\}$   
G.  $\{x: x > -6\}$   
H.  $\{x: x < -2\}$   
J.  $\{x: x > 2\}$   
K.  $\{x: x < 6\}$

11. In the standard  $(x,y)$  coordinate plane, which of the following lines goes through  $(3,4)$  and is parallel to  $y = 2x + 2$ ?

A.  $y = \frac{1}{2}x + 2$   
B.  $y = 2x - 2$   
C.  $y = 2x + 4$   
D.  $y = 2x + 10$   
E.  $y = 3x + 2$

12. What is the solution set of  $|3a - 2| \leq 7$ ?

A.  $\{a: a \leq 3\}$   
B.  $\left\{a: -\frac{5}{3} \leq a \leq 3\right\}$   
C.  $\left\{a: -\frac{5}{3} \geq a \geq 3\right\}$   
D.  $\left\{a: -\frac{5}{3} \leq a \geq 3\right\}$   
E.  $\left\{a: -\frac{5}{3} \geq a \leq 3\right\}$

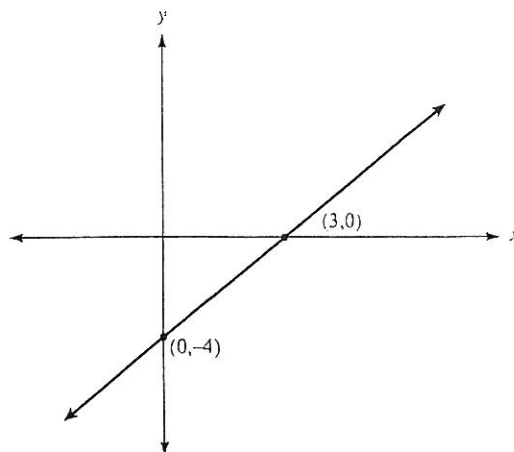
13. If  $\log_4 x = 3$ , then  $x = ?$

A.  $\frac{1}{\log_{12}}$   
B.  $4 \log^3$   
C. 12  
D. 64  
E. 81

14. The first and second terms of a geometric sequence are  $a$  and  $ab$ , in that order. What is the 643rd term of the sequence?

A.  $(ab)^{642}$   
B.  $(ab)^{643}$   
C.  $a^{642}b$   
D.  $a^{643}b$   
E.  $ab^{642}$

15. If a system of 2 linear equations in 2 variables has NO solution, and 1 of the equations is graphed in the  $(x,y)$  coordinate plane below, which of the following *could* be the equation of the other line?



F.  $y = -2$   
G.  $y = -\frac{1}{4}x + 2$   
H.  $y = -2x - 4$   
J.  $y = \frac{4}{3}x + 2$   
K.  $y = 4x - 4$

16. In the standard  $(x,y)$  coordinate plane, what is the equation of the line that passes through the origin and the point  $(3,4)$ ?

F.  $y = \frac{1}{4}x + \frac{3}{4}$   
G.  $y = \frac{1}{4}x - \frac{1}{3}$   
H.  $y = \frac{4}{3}x$   
J.  $y = \frac{1}{2}x + \frac{3}{4}$   
K.  $y = \frac{9}{4}x$

17. What is the  $y$ -coordinate of the point in the standard  $(x,y)$  coordinate plane at which the 2 lines  $y = \frac{x}{2} + 3$  and  $y = 3x - 2$  intersect?

F. 5  
G. 4  
H. 3  
J. 2  
K. 1

18. In the  $(x, y)$  coordinate plane, what is the  $y$ -intercept of the line  $-9x - 3y = 15$ ?
- A. -9
  - B. -5
  - C. -3
  - D. 3
  - E. 15

19. For what value of  $n$  would the following system of equations have an infinite number of solutions?

$$3a + b = 12$$

$$12a + 4b = 3n$$

- F. 4
- G. 9
- H. 16
- J. 36
- K. 48

20. What is the value of  $\log_4 64$ ?

- A. 3
- B. 4
- C. 8
- D. 10
- E. 16

21. What is the slope of a line that is perpendicular to the line determined by the equation  $7x + 4y = 11$ ?

- F. -4
- G.  $-\frac{7}{4}$
- H.  $\frac{11}{4}$
- J. 4
- K.  $\frac{4}{7}$

22. Which of the following is a value of  $n$  that satisfies  $\log_n 64 = 2$ ?

- F. 4
- G. 6
- H. 8
- J. 12
- K. 32

23. A system of linear equations is shown below.

$$4y = 3x + 12$$

$$-4y = -3x - 8$$

Which of the following describes the graph of this system of linear equations in the standard  $(x, y)$  coordinate plane?

- A. Two parallel lines with negative slope
- B. Two parallel lines with positive slope
- C. A single line with negative slope
- D. A single line with positive slope
- E. Two perpendicular lines

24. What is the slope of the line given by the equation  $21x - 3y + 18 = 0$ ?

- A. -7
- B. -3
- C.  $\frac{6}{7}$
- D.  $\frac{7}{6}$
- E. 7

25. Which of the following is the least common denominator for the expression below?

$$\frac{1}{a^2 \times b \times c} + \frac{1}{b^2 \times c} + \frac{1}{b \times c^2}$$

- F.  $b \times c$
- G.  $a \times b \times c$
- H.  $a^2 \times b \times c$
- J.  $a^2 \times b^2 \times c^2$
- K.  $a^2 \times b^4 \times c^5$

26. Given that  $y - 5 = \frac{1}{2}x + 1$  is the equation of a line, at

what point does the line cross the  $x$  axis?

- F. -15
- G. -12
- H. 1
- J. 4
- K. 6

27. For all  $x > 0$ ,  $\frac{1}{x} + \frac{3}{4} = ?$

- A.  $\frac{3}{4x}$
- B.  $\frac{4}{4x}$
- C.  $\frac{4 + 3x}{4x}$
- D.  $\frac{4}{4 + x}$
- E.  $\frac{4 + 3x}{4 - x}$

28. In the  $(x, y)$  coordinate plane, what is the  $y$ -intercept of the line  $5x + 3y = 8$ ?

- A.  $\frac{8}{3}$
- B. 3
- C.  $\frac{5}{3}$
- D.  $\frac{3}{5}$
- E.  $-\frac{5}{3}$

29. If  $|5 - 2x| > 5$ , which of the following is a possible value of  $x$ ?
- F. 2
  - G. 3
  - H. 4
  - J. 5
  - K. 6

30. What is the slope of any line parallel to the  $y$ -axis in the  $(x, y)$  coordinate plane?
- F.  $-1$
  - G. 0
  - H. 1
  - J. Undefined
  - K. Cannot be determined from the given information

31. For what value of  $b$  would the following system of equations have an infinite number of solutions?

$$\begin{aligned} 3x + 5y &= 27 \\ 12x + 20y &= 3b \end{aligned}$$

- A. 9
  - B. 27
  - C. 36
  - D. 81
  - E. 126
32. What is the solution set of  $|3a - 3| \geq 12$ ?
- A.  $a \geq 5$  and  $a \leq -5$
  - B.  $a \geq 5$  and  $a \leq -3$
  - C.  $a \geq -5$  and  $a \leq 5$
  - D.  $a \geq -5$  and  $a \leq 3$
  - E.  $a \leq 5$  and  $a \geq -5$
33. What is the slope of a line that is parallel to the line determined by the equation  $5x - 4y = 8$ ?
- A.  $-4$
  - B.  $-\frac{5}{4}$
  - C.  $\frac{5}{4}$
  - D. 2
  - E. 4
34. When graphed in the standard  $(x, y)$  coordinate plane, the lines  $x = -5$  and  $y = x - 5$  intersect at what point?
- A.  $(-5, -10)$
  - B.  $(-5, -5)$
  - C.  $(-5, 0)$
  - D.  $(0, -5)$
  - E.  $(0, 0)$

35. For some real number  $n$ , the graph of the line  $y = (n + 1)x + 6$  in the standard  $(x, y)$  coordinate plane passes through  $(4, 8)$ . What is the value of  $n$ ?

- A.  $-\frac{3}{2}$
- B.  $-\frac{1}{2}$
- C.  $\frac{1}{2}$
- D.  $\frac{3}{2}$
- E. 2

36. The sum of the real numbers  $a$  and  $b$  is 13. Their difference is 5. What is the value of  $ab$ ?
- A. 5
  - B. 8
  - C. 18
  - D. 36
  - E. 65

37. A system of linear equations is shown below.

$$\begin{aligned} 4y - 2x &= 8 \\ 4y + 2x &= 8 \end{aligned}$$

Which of the following describes the graph of this system of linear equations in the standard  $(x, y)$  coordinate plane?

- A. A single line with positive slope
- B. A single line with negative slope
- C. Two distinct intersecting lines
- D. Two parallel lines with positive slope
- E. Two parallel lines with negative slope

$x$	0	1	2	3
$f(x)$	-6	-5	-2	3

38. The table above gives values of the quadratic function  $f$  for selected values of  $x$ . Which of the following defines the quadratic function  $f$ ?
- A.  $f(x) = x^2 - 6$
  - B.  $f(x) = x^2 + 6$
  - C.  $f(x) = 2x^2 - 10$
  - D.  $f(x) = 2x^2 - 6$
  - E.  $f(x) = 2x^2 - 7$
39. Which of the following statements is NOT true about the geometric sequence 36, 18, 9, ...?
- F. The fourth term is 4.5.
  - G. The sum of the first five terms is 69.75.
  - H. Each consecutive term is  $\frac{1}{2}$  of the previous term.
  - J. Each consecutive term is evenly divisible by 3.
  - K. The common ratio of consecutive terms is 2:1.

40. In the standard  $(x,y)$  coordinate plane, the  $y$ -intercept of the line  $6x + 2y = 14$  is?
- A.  $-6$   
 B.  $-3$   
 C.  $2$   
 D.  $7$   
 E.  $14$

41. If  $f(x) = x^2 + 3$ , then  $f(x+y) = ?$
- F.  $x^2 + 2xy + y^2 + 3$   
 G.  $x^2 + 2xy + y^2$   
 H.  $x^2 + 2xy + 3$   
 J.  $x^2 + 3 + y$   
 K.  $x^2 + y^2$

42. What is the next term after  $-\frac{1}{3}$  in the geometric sequence  $9, -3, 1, -\frac{1}{3}, \dots$ ?

- A.  $-\frac{1}{9}$   
 B.  $0$   
 C.  $\frac{1}{9}$   
 D.  $\frac{1}{6}$   
 E.  $\frac{1}{3}$

43. What is the slope of the line given by the equation  $3x + 4y = -12$ ?

- A.  $-3$   
 B.  $-\frac{4}{3}$   
 C.  $-\frac{3}{4}$   
 D.  $\frac{3}{4}$   
 E.  $4$

44. Which of the following is a polynomial factor of  $x^2 - 2x - 24$ ?

- A.  $x - 4$   
 B.  $x + 4$   
 C.  $x + 6$   
 D.  $6 - x$   
 E.  $x$

45. In the equation  $r = \frac{4}{(2+k)}$ ,  $k$  represents a positive integer. As  $k$  gets larger without bound, the value of  $r$ :
- F. gets closer and closer to  $4$ .  
 G. gets closer and closer to  $2$ .  
 H. gets closer and closer to  $0$ .  
 J. remains constant.  
 K. gets larger and larger.

46. What are all the solutions for  $x$  if  $3x^2 - 2x - 21 = 0$ ?

- A.  $x = -21$  only  
 B.  $x = -7$  or  $x = 3$   
 C.  $x = -3$  or  $x = \frac{7}{3}$   
 D.  $x = -\frac{7}{3}$  or  $x = 3$   
 E.  $x = -3$  or  $x = 7$

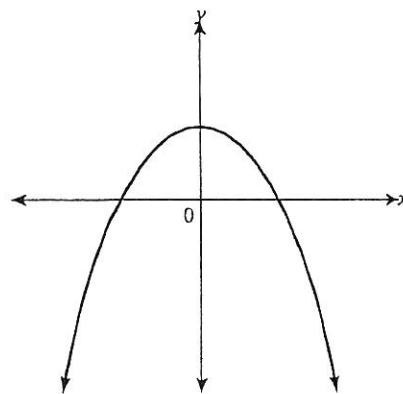
47. If  $x$  is any number other than  $3$  and  $6$ , then

- $\frac{(x-3)(x-6)}{(3-x)(x-6)} = ?$
- A.  $18$   
 B.  $1$   
 C.  $0$   
 D.  $-1$   
 E.  $-18$

48. For positive real numbers  $x$ ,  $y$ , and  $z$ , which of the following expressions is equivalent to  $x^{\frac{1}{2}}y^{\frac{3}{4}}z^{\frac{5}{8}}$ ?

- A.  $\sqrt[4]{xy^3z^5}$   
 B.  $\sqrt[8]{x^2y^3z^5}$   
 C.  $\sqrt[8]{x^4y^3z^5}$   
 D.  $\sqrt[8]{x^4y^6z^5}$   
 E.  $\sqrt[14]{xy^3z^5}$

49. The graph of  $y = ax^2 + bx + c$  in the standard  $(x,y)$  coordinate plane is shown below. When  $y = 0$ , which of the following best describes the solution set for  $x$ ?



- F. 2 imaginary solutions  
 G. 1 double imaginary solution  
 H. 1 real and 1 imaginary solution  
 J. 1 double imaginary solution  
 K. 2 real solutions
50. If  $|x| = x + 12$ , then  $x = ?$
- A.  $-12$   
 B.  $-6$   
 C.  $0$   
 D.  $6$   
 E.  $12$

51. If  $x^2 - 45b^2 = 4xb$ , what are the 2 solutions for  $x$  in terms of  $b$ ?

F.  $15b$  or  $-3b$   
G.  $5b$  or  $-9b$   
H.  $15b$  or  $3b$   
J.  $45b$  or  $-4b$   
K.  $9b$  or  $-5b$

52. For which of the following values of  $c$  will there be 2 distinct real solutions to the equation  $5x^2 + 16x + c = 0$ ?

F. 3  
G. 12  
H. 14  
J. 15  
K. 20

53. What is the slope of a line that is perpendicular to the line determined by the equation  $5x + 8y = 17$ ?

F.  $-3$   
G.  $-\frac{5}{8}$   
H.  $\frac{17}{8}$   
J.  $\frac{3}{17}$   
K.  $\frac{8}{5}$

54. A line in the standard  $(x, y)$  coordinate plane is parallel to the  $x$ -axis and 5 units below it. Which of the following is an equation of this line?

A.  $y = -5$   
B.  $x = -5$   
C.  $y = -5x$   
D.  $y = x - 5$   
E.  $x = y - 5$

55. What is the value of  $b$  in the solution to the system of equations below?

$$\begin{aligned} 3a - b &= 18 \\ a + 3b &= -4 \end{aligned}$$

F.  $-10$   
G.  $-3$   
H.  $3$   
J.  $6$   
K. cannot be determined with the given information

56. If  $\sqrt{2x} + 5 = 9$ , then  $x = ?$

A.  $-4$   
B.  $2$   
C.  $4$   
D.  $8$   
E.  $16$

57. An overlay of an accessibility ramp of a building is placed on the standard  $(x, y)$  coordinate plane so that the  $x$ -axis aligns with the horizontal. The line segment representing the side view of the ramp goes through the points  $(-2, -1)$  and  $(16, 2)$ . What is the slope of the accessibility ramp?

F.  $-3$   
G.  $-\frac{1}{3}$   
H.  $-\frac{1}{6}$   
J.  $\frac{1}{6}$   
K.  $\frac{1}{14}$

58. How many ordered pairs  $(x, y)$  of real numbers will satisfy the equation  $5x - 7y = 13$ ?

A. 0  
B. 1  
C. 2  
D. 3  
E. Infinitely many

59. If  $x^2 - y^2 = 49$  and  $x - y = 7$ , then  $x = ?$

F. 14  
G. 7  
H. 4  
J.  $-4$   
K.  $-7$

60. For all  $x > 4$ ,  $\frac{4x - x^2}{x^2 - 2x - 8} = ?$

F.  $-\frac{x}{x+2}$   
G.  $\frac{x}{x-2}$   
H.  $\frac{1}{x+2}$   
J.  $-\frac{1}{8}$   
K.  $\frac{1}{8}$